

FILEID***INIBIT

N 1

The image shows a 10x10 grid of symbols representing a sparse matrix. The symbols are as follows:

- 'I' (1)
- 'N' (-1)
- 'B' (2)
- 'T' (-2)
- 'S' (3)

The matrix structure is as follows:

- Diagonal: B (top-left to bottom-right)
- Super-diagonals: I (top-left to bottom-right), S (top-left to bottom-right)
- Sub-diagonals: N (top-right to bottom-left), T (top-right to bottom-left)

The matrix is surrounded by a border of 'L' symbols.

```
1 0001 0 MODULE INIBIT (
2 0002 0   LANGUAGE (BLISS32),
3 0003 0   IDENT = 'V04-000'
4 0004 0   ) =
5 0005 1 BEGIN
6 0006 1
7 0007 1
8 0008 1 ****
9 0009 1 *
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27 0027 1 *
28 0028 1 *
29 0029 1 ****
30 0030 1
31 0031 1 ++
32 0032 1
33 0033 1 FACILITY: INIT Utility Structure Level 1
34 0034 1
35 0035 1 ABSTRACT:
36 0036 1
37 0037 1   This routine initializes the contents of the volume storage bitmap.
38 0038 1
39 0039 1 ENVIRONMENT:
40 0040 1
41 0041 1   STARLET operating system, including privileged system services
42 0042 1   and internal exec routines.
43 0043 1
44 0044 1 --
45 0045 1
46 0046 1
47 0047 1 AUTHOR: Andrew C. Goldstein, CREATION DATE: 13-Nov-1977 14:37
48 0048 1
49 0049 1 MODIFIED BY:
50 0050 1
51 0051 1   V02-003 LMP0002      L. Mark Pilant      11-Nov-1981 13:15
52 0052 1   Fix bitmap allocation when a large number of blocks are
53 0053 1   to be allocated.
54 0054 1
55 0055 1   V02-002 ACG0191      Andrew C. Goldstein,  1-Apr-1981 10:33
56 0056 1   Fix index file allocation at end of volume
57 0057 1
```

58 0058 1 V0101 ACG0069 Andrew C. Goldstein, 9-Oct-1979 16:58
59 0059 1 Remove device data table
60 0060 1
61 0061 1 V0100 ACG00001 Andrew C. Goldstein, 10-Oct-1978 21:27
62 0062 1 Previous revision history moved to [INIT.SRC]INIT.REV
63 0063 1 **
64 0064 1
65 0065 1
66 0066 1 LIBRARY 'SY\$LIBRARY:LIB.L32';
67 0067 1 REQUIRE 'SRC\$:INIDEF.B32';
68 0358 1 REQUIRE 'LIBDS:[VMSLIB.OBJ]INITMSG.B32';

```
70 0490 1 GLOBAL ROUTINE INIT_BITMAP : NOVALUE =
71 0491 1
72 0492 1 | ++
73 0493 1
74 0494 1 | FUNCTIONAL DESCRIPTION:
75 0495 1
76 0496 1 | This routine initializes the contents of the volume storage bitmap.
77 0497 1
78 0498 1
79 0499 1 | CALLING SEQUENCE:
80 0500 1 | INIT_BITMAP ()
81 0501 1
82 0502 1 | INPUT PARAMETERS:
83 0503 1 | NONE
84 0504 1
85 0505 1 | IMPLICIT INPUTS:
86 0506 1 | device data table
87 0507 1 | allocation table
88 0508 1
89 0509 1 | OUTPUT PARAMETERS:
90 0510 1 | NONE
91 0511 1
92 0512 1 | IMPLICIT OUTPUTS:
93 0513 1 | NONE
94 0514 1
95 0515 1 | ROUTINE VALUE:
96 0516 1 | NONE
97 0517 1
98 0518 1 | SIDE EFFECTS:
99 0519 1 | storage bitmap file written
100 0520 1
101 0521 1 | --
102 0522 1
103 0523 2 BEGIN
104 0524 2
105 0525 2 BUILTIN
106 0526 2 | ROT:
107 0527 2
108 0528 2 LOCAL
109 0529 2 | BLOCK_COUNT,
110 0530 2 | MAP_LBN,
111 0531 2 | PREV_LBN,
112 0532 2 | NEXT_LBN,
113 0533 2 | INDEX,
114 0534 2 | BIT_COUNT,
115 0535 2 | MAP_VBN,
116 0536 2 | BIT_POS,
117 0537 2 | BIT_IDX;
118 0538 2
119 0539 2 EXTERNAL
120 0540 2 | INIT_OPTIONS : BITVECTOR,
121 0541 2 | ALLOC_TABLE_CNT : VECTOR,
122 0542 2 | ALLOC_TABLE_LBN : VECTOR,
123 0543 2 | BITMAP_CNT,
124 0544 2 | BITMAP_LBN,
125 0545 2 | VOLUME_SIZE,
126 0546 2 | CLUSTER,
```

| number of blocks in storage map
| LBN of current bitmap block
| start LBN + 1 of last entry processed
| start LBN of current allocation table entry
| table index of current entry
| number of bits to clear in storage map
| relative block in storage map to use
| bit position of start of area
| index into bitmap buffer

| command option flags
| allocation block count table
| allocation LBN table
| block count of storage map file
| starting LBN of storage map file
| size of volume rounded to next cluster
| volume cluster factor

```
127      0547 2      BUFFER      : BBLOCK,  
128      0548 2      DEVICE_CHAR : BBLOCK;      ; I/O buffer  
129      0549 2      ; device characteristics  
130      0550 2      EXTERNAL LITERAL  
131      0551 2      ALLOC_MAX    : UNSIGNED (16); ! total number of entries in allocation table  
132      0552 2      ;  
133      0553 2      EXTERNAL ROUTINE  
134      0554 2      CHECKSUM2,  
135      0555 2      WRITE_BLOCK;      ; compute block checksum  
136      0556 2      ; write block on volume  
137      0557 2      ;  
138      0558 2      ! Build the storage control block and write it out.  
139      0559 2      ;  
140      0560 2      ;  
141      0561 2      CH$FILL (0, 512, BUFFER);  
142      0562 2      ;  
143      0563 2      IF .INIT_OPTIONS[OPT_STRUCTURE1]  
144      0564 2      THEN  
145      0565 3      BEGIN  
146      0566 3      MAP BUFFER : VECTOR;  
147      0567 3      BLOCK COUNT = .BITMAP_CNT - 1;  
148      0568 3      IF .BLOCK_COUNT GTRU T26  
149      0569 3      THEN BLOCK_COUNT = 0;  
150      0570 3      ;  
151      0571 3      (BUFFER+3)<0,8> = .BLOCK_COUNT;  
152      0572 3      INCR J FROM 0 TO .BLOCK_COUNT - 1  
153      0573 3      DO BUFFER[.J+1] = 4096;  
154      0574 3      BUFFER[.BLOCK_COUNT+1] = ROT (.VOLUME_SIZE, 16);  
155      0575 3      END  
156      0576 3      ;  
157      0577 2      ELSE  
158      0578 3      BEGIN  
159      0579 3      BUFFER[SCBSW_STRUCTURE] = SCBS_C_LEVEL2 + 1;  
160      0580 3      BUFFER[SCBSW_CLUSTER] = .CLUSTER;  
161      0581 3      BUFFER[SCBSL_VOLSIZE] = .DEVICE_CHAR[DIBSL_MAXBLOCK];  
162      0582 4      BUFFER[SCBSL_BLKSIZE] = (.DEVICE_CHAR[DIB$B_SECTORS]  
163      0583 4      * .DEVICE_CHAR[DIB$B_TRACKS]  
164      0584 4      * .DEVICE_CHAR[DIB$W_CYLINDERS])  
165      0585 3      / .DEVICE_CHAR[DIBSL_MAXBLOCK];  
166      0586 3      BUFFER[SCBSL_SECTORS] = .DEVICE_CHAR[DIB$B_SECTORS];  
167      0587 3      BUFFER[SCBSL_TRACKS] = .DEVICE_CHAR[DIB$B_TRACKS];  
168      0588 3      BUFFER[SCBSL_CYLINDER] = .DEVICE_CHAR[DIB$W_CYLINDERS];  
169      0589 3      ;  
170      0590 3      CHECKSUM2 (BUFFER, $BYTEOFFSET (SCBSW_CHECKSUM));  
171      0591 2      END;  
172      0592 2      ;  
173      0593 2      WRITE_BLOCK (.BITMAP_LBN, BUFFER);  
174      0594 2      ;  
175      0595 2      ! Now write the contents of the bitmap, marking off the areas listed in the  
176      0596 2      allocation table. To save disk thrashing, we process the table entries  
177      0597 2      in LBN order.  
178      0598 2      ;  
179      0599 2      ;  
180      0600 2      MAP LBN = .BITMAP_LBN + 1;  
181      0601 2      CH$FILL (-1, 512, BUFFER);  
182      0602 2      PREV_LBN = 0;  
183      0603 2      WHILE 1 DO
```

```
184 0604 3 BEGIN
185 0605 3
186 0606 3 | Search the allocation table for the lowest LBN which is greater than the
187 0607 3 | one previously processed.
188 0608 3
189 0609 3
190 0610 3
191 0611 3 | NEXT_LBN = -1;
192 0612 4 | INCR J FROM 0 TO ALLOC_MAX-1 DO
193 0613 4 | BEGIN
194 0614 4 | IF .ALLOC_TABLE_LBN[J] GEQU .PREV_LBN
195 0615 4 | AND .ALLOC_TABLE_LBN[J] LSSU .NEXT_LBN
196 0616 5 | THEN
197 0617 5 | BEGIN
198 0618 5 | NEXT_LBN = .ALLOC_TABLE_LBN[J];
199 0619 4 | INDEX = .J;
200 0620 3 | END;
201 0621 3 | IF .NEXT_LBN EQL -1 THEN EXITLOOP; ! done all entries
202 0622 3 | PREV_LBN = .NEXT_LBN + 1;
203 0623 3
204 0624 3 | For this group of blocks, compute the bit count and block and bit offset
205 0625 3 | from the current block in the storage map.
206 0626 3
207 0627 3
208 0628 3 | BIT_COUNT = .ALLOC_TABLE_CNT[.INDEX] / .CLUSTER;
209 0629 3 | BIT_POS = .NEXT_LBN / .CLUSTER - (.MAP_LBN - .BITMAP_LBN - 1) * 4096;
210 0630 3
211 0631 3 | Now mark off the blocks represented by the allocated entry. This is coded
212 0632 3 | one bit at a time to keep the code simple; the areas are not large enough
213 0633 3 | in general to warrant more intelligent code. If the bit position points
214 0634 3 | off the end of the current block, pass blocks until its doesn't.
215 0635 3
216 0636 3
217 0637 3 | UNTIL .BIT_POS LSSU 4096 DO
218 0638 4 | BEGIN
219 0639 4 | WRITE_BLOCK(.MAP_LBN, BUFFER);
220 0640 4 | CH$FILE (-1, 512, BUFFER);
221 0641 4 | MAP_LBN = .MAP_LBN + 1;
222 0642 4 | BIT_POS = .BIT_POS - 4096;
223 0643 3 | END;
224 0644 3
225 0645 3 | DECR J FROM .BIT_COUNT TO 1 DO
226 0646 4 | BEGIN
227 0647 4 | MAP_BUFFER : BITVECTOR;
228 0648 4
229 0649 4 | BUFFER[.BIT_POS] = 0;
230 0650 4 | BIT_POS = .BIT_POS + 1;
231 0651 4
232 0652 4 | IF .BIT_POS GEQU 4096
233 0653 4 | THEN
234 0654 5 | BEGIN
235 0655 5 | WRITE_BLOCK(.MAP_LBN, BUFFER);
236 0656 5 | CH$FILE (-1, 512, BUFFER);
237 0657 5 | MAP_LBN = .MAP_LBN + 1;
238 0658 5 | BIT_POS = 0;
239 0659 4 | END;
240 0660 3 | END;
```

```

.TITLE INIBIT
.IDENT \V04-0001

.EXTRN INIT_OPTIONS, ALLOC_TABLE_CNT
.EXTRN ALLOC_TABLE_LBN
.EXTRN BITMAP_CNT, BITMAP_LBN
.EXTRN VOLUME_SIZE, CLUSTER
.EXTRN BUFFER, DEVICE_CHAR
.EXTRN ALLOC_MAX, CHECKSUM2
.EXTRN WRITE_BLOCK

.PSECT $CODE$, NOWRT, 2

.ENTRY INIT_BITMAP, Save R2, R3, R4, R5, R6, R7, R8, R9, - ; 0490
        R10, R11
        #4, SP
        #0, (SP), #0, #512, BUFFER ; 0561

        TSTB INIT_OPTIONS+3 ; 0563
        BGEQ 4$ ; 0567
        SUBL3 #1, BITMAP_CNT, BLOCK_COUNT ; 0568
        CMPL BLOCK_COUNT, #126 ; 0569
        BLEQU 1$ ; 0571
        CLRL BLOCK_COUNT ; 0572
        MOVB BLOCK_COUNT, BUFFER+3 ; 0573
        MNEGL #1, J ; 0574
        BRB 3$ ; 0579
        MOVZWL #4096, BUFFER+4[J] ; 0580
        A0BLSS BLOCK_COUNT, J, 2$ ; 0581
        ROTL #16, VOLUME_SIZE, BUFFER+4[BLOCK_COUNT] ; 0582
        BRB 5$ ; 0583
        MOVW #513, BUFFER ; 0584
        MOVW CLUSTER, BUFFER+2 ; 0585
        MOVL DEVICE_CHAR+112, BUFFER+4 ; 0586
        MOVZBL DEVICE_CHAR+8, R0 ; 0587
        MOVZBL DEVICE_CHAR+9, R1 ; 0588
        MULL2 R1, R0 ; 0589

```

0200	8F	FF	8F	0000G CF	52	0000G	CF	3C 00069	MOVZWL	DEVICE_CHAR+10, R2	: 0584
				0000G CF	50	0000G	CF	C4 0006E	MULL2	R2, R0	0585
				0000G CF	50	0000G	CF	C7 00071	DIVL3	DEVICE_CHAR+112, R0, BUFFER+8	0586
				0000G CF	50	0000G	CF	9A 00079	MOVZBL	DEVICE_CHAR+8, BUFFER+12	0587
				0000G CF	7E	0000G	CF	9A 00080	MOVZBL	DEVICE_CHAR+9, BUFFER+16	0588
				0000G CF	01FE	01FE	8F	3C 00087	MOVZWL	DEVICE_CHAR+10, BUFFER+20	0589
				0000G CF	0000G	0000G	CF	9F 0008E	MOVZWL	#510, = (SP)	0590
				0000G CF	0000G	0000G	02	FB 00097	PUSHAB	BUFFER	0593
				0000G CF	0000G	0000G	CF	9F 0009C	CALLS	#2, CHECKSUM2	
				0000G CF	0000G	0000G	CF	DD 000A0	PUSHAB	BUFFER	
				0000G CF	6E	0000G	02	FB 000A4	PUSHL	BITMAP_LBN	0593
				0000G CF	6E	0000G	01	C1 000A9	CALLS	#2, WRITE_BLOCK	
				0000G CF	6E	0000G	00	2C 000AF	ADDL3	#1, BITMAP_LBN, MAP_LBN	0600
				0000G CF	6E	0000G	CF	000B7	MOVCS	#0, (SP), #1, #512, BUFFER	0601
					59		6E	D4 000BA	CLRL	PREV_LBN	0602
					50		59	01 CE 000BC	MNEG1	#1, NEXT_LBN	0610
					50		50	01 CE 000BF	MNEG1	#1, J	0613
					51	0000GCF	40	D0 000C4	BRB	8\$	
					6E		51	D1 000CA	MOVL	ALLOC_TABLE_LBN[J], R1	
							51	0B 1F 000CD	CMPL	R1, PREV_LBN	
					59		51	D1 000CF	BLSSU	8\$	
					59		06	1E 000D2	CMPL	R1, NEXT_LBN	0614
					59		51	D0 000D4	BGEQU	8\$	
					59		50	D0 000D7	MOVL	R1, NEXT_LBN	0617
					5B	00000000G	8F	F3 000DA	AOBLEQ	J, INDEX	0618
					E2	FFFFFFFFFF	8F	59 D1 000E2	#ALLOC_MAX-1, J, 7\$	NEXT_LBN, #-1	0611
							03	12 000E9	CMPL	9\$	0621
							0084	31 000EB	BNEQ	9\$	
									BRW	15\$	
					5A	0000GCF	4B	01 A9 9E 000EE	MOVAB	1(R9), PREV_LBN	0622
					51		0000G	CF C7 000F2	DIVL3	CLUSTER, AL[OC_TABLE_CNT[INDEX], BIT_COUNT	0628
					50		59 0000G	CF C7 000FB	DIVL3	CLUSTER, NEXT [BN, RT	0629
					50		56 0000G	CF C3 00101	SUBL3	SUBL3	
					50		50	OC 78 00107	ASHL	BITMAP_LBN, MAP_LBN, R0	
					51		51	C2 0010B	SUBL2	#12, R0, R0	
					58	00001000	8F	1000 C1 9E 0010E	MOVAB	RO, R1	
					58		58 D1 00113	4096(R1), BIT_POS	CMPL	4096(R1), BIT_POS	0637
							1F 1F 0011A	BLSSU	11\$		
							0000G CF 9F 0011C	PUSHAB	BUFFER		0639
							56 DD 00120	PUSHL	MAP_LBN		
							02 FB 00122	CALLS	#2, WRITE_BLOCK		
							00 2C 00127	MOVCS	#0, (SP), #-1, #512, BUFFER		
							CF 0012F	INCL	MAP_LBN		
							56 D6 00132	MOVAB	-4096(R8), BIT_POS		
							C8 9E 00134	BRB	10\$		
							D8 11 00139	MOVAB	1(R10), J		
							57 01 AA 9E 0013B	BRB	14\$		
					00	0000G CF	58 E5 00141	BBCC	BIT_POS, BUFFER, 13\$		
					00001000	8F	58 D6 00147	INCL	BIT_POS		
							58 D1 00149	CMPL	BIT_POS, #4096		
							1A 1F 00150	BLSSU	14\$		
							0000G CF 9F 00152	PUSHAB	BUFFER		
							56 DD 00156	PUSHL	MAP_LBN		
							02 FB 00158	CALLS	#2, WRITE_BLOCK		
							00 2C 0015D	MOVCS	#0, (SP), #-1, #512, BUFFER		
										: 0656	

0200	8F	00	6E	0000G	CF	0000G	CF	00165	56	D6	00168	INCL	MAP_LBN	0657		
									58	D4	0016A	CLRL	BIT_POS	0658		
					D2			57	F5	0016C	14\$:	SOBGTR	J, T2\$	0645		
						FF4A	31	0016F	15\$:	BRW	6\$			0603		
						0000G	CF	9F	00172	15\$:	PUSHAB	BUFFER		0668		
							56	DD	00176		PUSHL	MAP_LBN				
		00	6E				02	FB	00178		CALLS	#2,_WRITE_BLOCK		0669		
		50	0000G	CF		0000G	CF	56	D6	0017D	INCL	MAP_LBN		0670		
							00	2C	0017F		MOVCS	#0,(SP), #0, #512, BUFFER				
								CF	00186					0672		
								CF	C1	00189	16\$:	ADDL3	BITMAP_CNT, BITMAP_LBN, R0			
								56	D1	00191		CMPL	MAP_LBN, R0			
								50	OF	1E	00194	BGEQU	17\$		0674	
									0000G	CF	9F	00196	PUSHAB	BUFFER		
										56	DD	0019A	PUSHL	MAP_LBN		
										02	FB	0019C	CALLS	#2,_WRITE_BLOCK		0675
										56	D6	001A1	INCL	MAP_LBN		0672
										E4	11	001A3	BRB	16\$		0678
										04	001A5	17\$:	RET			

; Routine Size: 422 bytes, Routine Base: SCODE\$ + 0000

: 259 0679 1
: 260 0680 1 END
: 261 0681 0 ELUDOM

PSECT SUMMARY

Name	Bytes	Attributes
SCODES	422	NOVEC,NOWRT, RD , EXE,NOSHR, LCL, REL, CON,NOPIC,ALIGN(2)

Library Statistics

File	----- Symbols -----			Pages	Processing
	Total	Loaded	Percent	Mapped	Time
\$_\$255\$DUA28:[SYSLIB]LIB.L32;1	18619	18	0	1000	00:02.0

COMMAND QUALIFIERS

INIBIT
V04-000

J 2
16-Sep-1984 01:43:57 VAX-11 Bliss-32 V4.0-742
14-Sep-1984 12:35:13 DISK\$VMSMASTER:[INIT.SRC]INIBIT.B32;1 Page 9 (2)

: BLISS/CHECK=(FIELD,INITIAL,OPTIMIZE)/LIS=LIS\$:INIBIT/OBJ=OBJ\$:INIBIT MSRC\$:INIBIT/UPDATE=(ENHS:INIBIT)

: Size: 422 code + 0 data bytes
: Run Time: 00:14.5
: Elapsed Time: 00:29.3
: Lines/CPU Min: 2827
: Lexemes/CPU-Min: 34999
: Memory Used: 150 pages
: Compilation Complete

IN
VO

0187 AH-BT13A-SE
VAX/VMS V4.0

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